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Pages: 3 (incl. cover)

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Date: June 7, 2006

Re: Serial No. 10/05/150

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(Attorney Docket No. 5150-61502)

• Comments:

Attached please find pages 5 and 17 of the original specification, as filed on October 29, 2001.

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would allow the user to purchase one measurement device and use this measurement device for multiple different uses. This would also allow the user more flexibility in creating customer-defined measurement solutions. Therefore, improved measurement systems are desired which address one or more of the issues described above.

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configuration. After configuration with the test feed-through configuration, the programmable hardware element is operable to provide for communication between the one or more fixed hardware resources and the program.

Finally, the computer system may execute the program for test and analysis. Executing the program includes the program communicating with the one or more fixed hardware resources through the programmable hardware element. In other words, the computer system may execute the program while maintaining connectivity with the one or more fixed hardware resources via the test feed-through configured programmable hardware element, and thus interacting with the "real world" signals and behavior of the hardware resources. This allows both fast and accurate testing of programs to be deployed on the RIO device.

In the preferred embodiment, the test feed-through configuration is pre-compiled, so that the programmable hardware element may be configured with the test feedthrough configuration without having to perform a lengthy compilation. It should be noted that the debugging system and method described herein is applicable to any reconfigurable system using a programmable hardware element and one or more fixed hardware resources. For example, the program may be any of a measurement program which is executable to perform a measurement function, an automation program which is executable to perform an automation function, a control program which is executable to perform a control function, and a simulation program which is executable to perform a simulation function, among others.

Thus, in one embodiment, FPGA in a RIO system may be configured to include one or more of: I/O and timed I/O elements, buses, clocks, memories (e.g., FIFOs) and real time trigger buses (e.g., RTSI), various functions or features provided by a vendor, basic services and environment functions, and custom functions and interfaces provided or specified by the customer. Additionally, the FPGA may include debug/simulation functions which facilitate the testing and debugging process described above.

Programming Interface Protocol